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Washington

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Minimum Requirements

FOR

SAFETY AND INDUSTRIAL HEALTH

IN

CONTRACT SHIPYARDS

308
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Approved
U. S. Navy
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U. S. NAVY DEPARTMENT
WASHINGTON, D. C.

U. S. MARITIME COMMISSION
WASHINGTON, D. C.

To All Contractors Constructing Ships for United States Navy–United States Maritime Commission:

As a result of the national conference on safety and health in shipyards holding contracts with the United States Navy and Maritime Commission, conducted under the auspices of these agencies in Chicago December 7 and 8, 1942, a unanimous agreement was reached upon the minimum standards which have now been approved by the Navy Department and United States Maritime Commission and which should be put into effect in shipyards holding contracts with the two agencies.

These standards represent a specialized study based upon a fact-finding survey on all coasts by experts in that field. They have received the unanimous concurrence of the representatives of the medical and safety departments and of labor-management committees from shipyards on all coasts.

The necessity for conserving manpower and promoting the physical welfare, health, and safety of what shortly will amount to one million workers in shipyards requires that careful observance of standards for the prevention of accidents and protection of health be accorded. Aside from the weight which must be given humanitarian considerations, it is simply good common sense that as much care and attention be given to protecting the human factors in the war production program as is given machines.

Under the administrative direction of the Maritime Commission, safety and industrial health consultants will be made available in all regions wherein shipyards holding contracts with the Navy and the Commission are located.

Each contractor is hereby given notice that the Navy Department and the Maritime Commission will expect full and complete compliance with the minimum standards which bear the approval of the Navy Department and the Maritime Commission, and each is requested to give full cooperation to the consultants on health and safety who will be charged with the coordination and supervision of the safety and health programs of the two agencies.

The cumulative restriction of manpower makes speedy attention and comprehensive action in respect to the subject matter hereof of vital importance.

Frank Knox

FRANK KNOX, *Secretary of the Navy.*

E. S. Land

E. S. LAND, *Chairman,*
U. S. Maritime Commission.

511314—43——1

UNITED STATES NAVY—MARITIME COMMISSION

MINIMUM REQUIREMENTS
FOR
SAFETY AND INDUSTRIAL HEALTH IN CONTRACT SHIPYARDS

S and H–1. Introduction.

1.1 The standards for industrial health and safety as presented in this manual cover only minimum requirements. It is not to be assumed that compliance with these minimum standards is insurance of the development of good health and safety records.

1.2 It is recognized that in many shipyards, standards for health and safety are already in effect which go beyond the requirements of those listed here. The Maritime Commission and Navy urge that any standards of higher level be continued and that where substandard conditions of health and safety exist, they immediately be brought to the required standard or better.

1.3 In all cases the use of the words *shall* or *must* indicates that compliance with that section of the minimum requirements is mandatory. Where the words *should* or *may* are used the section may be considered desirable but not necessarily mandatory under certain circumstances which the contractor in his discretion may determine.

MINIMUM REQUIREMENTS FOR INDUSTRIAL HEALTH

H–2. Medical Facilities.

2.1 *Personnel.*—Yards employing up to 5,000 men should have two full-time physicians, and one additional physician for each additional 5,000 men. Yards with less than 2,000 to 3,000 men will not need full-time physicians.

2.2 Specialists in the various branches of the medical profession available in the area should be consulted as indicated.

2.3 Yards employing up to 5,000 men should have in the main dispensary six full-time nurses and three additional nurses for each additional 5,000. Additional nurses will be required for first aid stations.

2.4 There should be at least three clerks employed in the medical department for each 5,000 employees.

2.5 One ambulance driver should be available per ambulance per shift.

H–3. Physical Facilities.

3.1 The medical department should be provided with:

a. A waiting room with suitable registration facilities.

b. A general treatment room.

c. An eye treatment room.

d. A minor surgery room.

e. A ward with three beds for the first 5,000 employees, and one bed for each additional 10,000.

f. Doctors' offices and private examining rooms.

g. A nurses' office and dressing room.

h. X-ray room for yards employing 5,000 men and above.

i. A physiotherapy room.

j. Toilet facilities for doctors, nurses, and patients.

k. A storeroom for general medical stores.

l. X-ray files and viewing room.

3.2 First-aid treatment rooms, manned by nurses, should be provided wherever there is overcrowding at the main dispensary and loss of time due to distance from shipways and shops. These substations may be located under building ways or near locations where the number of men working is large so that the distance a man need travel to a sub-station will not exceed approximately 400 yards.

H–4. Equipment.

4.1 The following equipment should be provided:

a. One ambulance for each 15,000 employees, or reasonable fraction thereof, with an ordinary passenger car always in reserve.

b. In some yards a station wagon is used satisfactorily inside the yard and an ambulance used only for trips outside.

c. An X-ray unit for yards employing about 5,000 men and above.

d. Medical and surgical stores required for minor surgery, eye injuries and physiotherapy.

H–5. Records and Forms.

5.1 The following records and forms are recommended:

NOTE.—*In an emergency no form need be filled out.*

a. A form authorizing the workman to report to the medical department for examination or treatment issued by a foreman or leading man or other supervisor. This shall show time of issue, arrival at dispensary, discharge from dispensary and return to work.

b. Appointment form for revisits and retreatments issued by the physicians and nurses.

c. A disposition form issued by physicians and nurses indicating return to work, hospitalization, to home, or other disposition.

d. A complete and accurate permanent filing system recording personal data, nature and cause of injury, diagnosis, treatment, disposition, and results.

e. The necessary state and insurance company forms.

f. Daily report to the safety department showing all new cases for the day, together with the nature and cause of injury, and the *diagnosis.*

g. The adoption of the standard nomenclature when made available by the Council on Industrial Health of the American Medical Association, Chicago, Illinois.

H–6. Examinations.

6.1 Physical examinations to insure proper placement of employees shall be given.

6.2 Periodic check examinations shall be given men working in occupations potentially hazardous to themselves or others, as for example to crane operators, locomotive and hoisting and portable engineers. Periodic check examinations should be given men in jobs in which there may be health hazard, as for example to sand blasters, radium and X-ray workers, and paint sprayers.

6.3 Special examinations such as X-ray, seriologic and urinalyses shall be given in the individual case as indicated and in accordance with local needs.

H–7. Air Raid Precautions.

7.1 The medical department shall locate, equip, and maintain such emergency first aid dressing stations as may be deemed necessary to handle air raid casualties.

7.2 A certain number of yard employees shall be trained in first aid procedures to render assistance to the medical department in handling air raid victims.

7.3 Close cooperation should be maintained with the local civilian defense officials in order that evacuation and care of air raid victims may be carried out to the best advantage.

7.4 In keeping with local army and navy regulations, steps should be taken to provide protection of dispensaries by sandbags, or otherwise, from fragments and concussion of bombs.

H–8. Responsibilities of the Medical Services.

8.1 Frequent inspection of the yard by the medical staff shall be required in order that physicians may become familiar with shipyard jobs and thus help intelligently in preventing accidents and occupational disease.

8.2 Close collaboration shall be maintained with the safety department especially in regard to records of accidents and absenteeism.

8.3 It shall be the joint responsibility of the medical and safety departments through the supplies department to know the composition of paints, thinners, paint removers, and other chemicals used in the yard, and to see that the workers exposed are protected by the best safety practices.

8.4 As in the general practice of medicine the confidential relations of doctor and patient shall be maintained.

8.5 It is certain that in the near future women in large numbers are to be employed in the mechanical trades. It is necessary in shipyards to make special provisions for this class of patients. This will necessitate the establishment of separate waiting, treatment, and examining rooms. In yards where the number of employees is large, it may be logical to establish a separate dispensary for the handling of women patients.

H–9. Sanitary Inspections.

9.1 *Cafeterias and canteens.*—It shall be the duty of the medical department to adapt from Army and Navy standards, in reasonable conformity with the local health department rules, and inspection scheme to include preemployment examination of food handlers, quality and quantity of food, general cleanliness and comfort, screening, dishwashing, garbage and waste disposal. These inspections shall be made at unscheduled times and never less than once each week.

9.2 *Water supply, sewerage, and waste disposal.*—In cooperation with Maritime and Navy engineers the medical department shall inspect and report upon the above as often as seems advisable, but not less than twice yearly.

9.3 *Salt tablets.*—Salt tablets shall be made available to all employees and shall be kept in covered dispensers appropriately located.

H–10. Respiratory Protective Equipment for Shipyards.

The U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, Penna., maintains a laboratory which tests and *approves* for use in industry respiratory protective equipment of all kinds. The Maritime Commission and Navy will require the use of *approved* equipment throughout all yards. The safety department shall be responsible for instructing men in the proper use of such equipment and for the maintenance of ample supplies.

10.1 Details of Bureau of Mines respirators with names of manufacturers, prices, and descriptions can be obtained from the Bureau or from the Maritime Commission.

10.2 The safety department shall be responsible to the management for cleaning and sterilizing all such equipment as often as may be agreed upon with the medical department. (A method for such sterilization is included in these standards; see section H–12.0)

10.3 *General requirements for respirators.*—

a. Adequate protection as defined by American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs. Handbook H–24, Nov. 1, 1938. Superintendent of Documents, Washington, D. C.; price 15¢.

b. Comfort (light weight and not obstructive to vision).

H–11. Jobs Requiring Respiratory Protective Equipment.

11.1 *Dust.*—

JOBS	PROTECTIVE DEVICES
Silica of Sand Dusts (as in sand blasting)	(1) Abrasive blasting helmets. (2) Dust respirator.
Lead Dust (as in mixing paint)	(1) Air line respirator. (2) Lead dust respirator.
Asbestos (as in covering pipes)	(1) Air line respirator. (2) Dust respirator.

11.2 *Metal fumes and smokes.*—

JOBS	PROTECTIVE DEVICES
Lead and zinc oxide from welding and burning.	(1) Air line respirator. (2) Fume respirator for lead. (3) Dust respirator for zinc oxide.

11.3 *Solvent vapors.*—

JOBS	PROTECTIVE DEVICES
Spray painting, both indoors and outdoors. Paint removing, usually indoors Cementing, usually indoors Cleaning, usually indoors Degreasing, usually indoors	(1) Air line respirator. (2) Chemical cartridge respirator.

11.4 *Acid gases and mists.*—

JOBS	PROTECTIVE DEVICES
Pickling (indoors) Cleaning (indoors) Degreasing (indoors)	(1) Mist respirator. (2) Chemical cartridge respirator.

11.5 *Alkali mists.*—

JOBS	PROTECTIVE DEVICES
Cleaning (indoors) Degreasing (indoors)	(1) Mist respirator. (2) Chemical cartridge respirator.

11.6 *Asphyxiating atmospheres.*—

PROTECTIVE DEVICES

(1) Nose mask.
(2) Oxygen-breathing mask.
(3) All-service mask.

11.7 *Air supply for air-line masks of all kinds.*—Air at a comfortable temperature and free from odors and excessive moisture sometimes is difficult to furnish, especially for outdoor jobs in winter. Air quality and temperature shall be tested by the Safety Department and shall meet the suggestions of the American Standard Safety Code for air-supplied respirators (sec. 10.3a).

H–12. Sterilization of Respirators.

12.1 Each worker who needs a respirator should be assigned his own respirator. Where this is not done, it is important that the respirator be sterilized in addition to being cleaned. Adequate sterilization may be accomplished by—

511314—43——2

a. Washing the rubber and metal parts with soap, a brush and warm water, after which the respirator is sterilized by immersion for 10 minutes in a solution of formalin made by placing one part of 40 percent formaldehyde solution into nine parts of water.

b. Washing the rubber and metal parts with soap and warm water, after which the respirator is sterilized by dipping in a 3 percent solution of carbolic acid, a 2 percent solution of lysol, or a 70 percent solution of denatured alcohol.

c. Subjecting the respirator to sterilization by a moist atmosphere of antiseptic gas, preferably formaldehyde, for a period of ten minutes at room temperature.

d. After following any one of the outlined procedures, the respirator should be rinsed with water and hung up to dry. The respirator should not be used until it has been dried thoroughly.

e. The filters, felt screens, and elastic headbands should be removed, if detachable, before washing or sterilization of the respirator, unless it is evident that washing and sterilization will not harm these parts.

12.2 The National Safety Council has issued an Industrial Data Sheet No. D–Gen. 16, "Cleaning and Sterilizing Goggles and Respiratory Equipment."

H–13. A Guide for Prevention of Industrial Disease in Shipyards.

13.1 Eight common types of disease and methods for their prevention are given in the following sections. Help in applying these methods will be given by the local Safety Department and by safety and medical consultants of the Navy Department and the Maritime Commission.

13.2 *Flashburns and foreign bodies in the eye.—*

a. Effects on workers: "Flash" is a surface eye burn resulting from even momentary unprotected exposure to the welding arc. In this condition the eye is painful and sensitive, especially to light. An eye flash shall be treated only by the doctor or by methods he has prescribed.

b. Foreign bodies in the eye shall be removed only under the doctor's orders or by methods he has prescribed. Like flashburns, they are preventable.

c. For safe practice:

All workers:

1. Whenever near welding areas wear antiflash goggles which have been approved by the Safety Department.
2. Wear safety goggles when grinding, chipping, buffing, scratch-brushing, or forging.

Welders:

3. Wear approved antiflash goggles even when helmet is being worn.
4. Use portable screens to protect the eyes of fellow workers.

13.3 *Lead poisoning.—*

a. Sources: In general, any job in which dust, fume, or smoke from any substance containing lead is breathed daily.

b. For example:

JOB:	WHEN MATERIAL IS:
Welding	Metal, coated with paint containing lead.
Cutting	Lead.
Burning	Lead pigments.
Shrinking	
Grinding	
Buffing	
Spray painting	
Mixing paint pigments	

c. Job can be done safely with:

1. (a) Special ventilation: Use a local exhaust hood approximately 8 inches from the job and drawing at least 200 c. f. m. into the hood with filtration of the discharge, or discharge, to a place where the contaminated air will not be breathed, or
   (b) Wearing of fume respirators, or
   (c) Wearing of supplied air respirator.
2. Periodic medical examination which includes blood and urinalyses.

13.4 *Solvent vapors.—*

a. Sources: In general, any job in which solvent vapors are breathed. For example:

Spray painting.
Painting.
Using paint remover.
Applying cements.
Paint brush and spray gun cleaning.

b. Job can be safely done with:

1. Segregation of such work, and
2. (a) Special ventilation as may be required.
   (b) Provision of spray booths with exhaust system.

(c) Wearing of special respirators:

(1) For spray painting: Supplied air respirators or air line hoods.

(2) For other jobs: Chemical cartridge respirators.

(See H–10 on respiratory protective equipment.)

13.5 *Zinc fume fever (zinc chills or shakes).*—

a. Sources: In general, any job in which the fumes from heated zinc are breathed. For example:

JOB:	WHEN MATERIAL IS:
Welding	Galvanized metal
Cutting	Zinc
Shrinking	Zinc alloy
Pouring zinc alloys	Brass

b. Job can be safely done with:

1. Special ventilation: Local exhaust hoses or hoods located close enough to operation at all times to remove smoke completely.
2. Wearing of special respirators.

NOTE.—There are no known cumulative effects from zinc chills.

13.6 *Fiberglas.*—

a. Effects on workers: Men working with Fiberglas may develop a dermatitis or conjunctivitis which are skin and eye conditions. It is best to transfer to another job those who continue to be sensitive.

1. Both experimental and practical evidence show conclusively that the inhalation of Fiberglas causes no lung damage.
2. The cement used with Fiberglas may contain a toxic solvent such as carbon tetrachloride (CCl_4) which can cause severe illness or even death if the cement is used indoors with inadequate ventilation.

b. For safe practice:

1. Clothing: Supply loose coveralls with collars and sleeves buttoned over cheesecloth.
2. Goggles: Should be worn.
3. Shower: Should be taken rather than bath, at end of shift.

Respirators are usually not necessary, *but* if a cement containing a toxic solvent is used, proper protection either by ventilation or by a respirator must be supplied and used.

13.7 *Asbestosis.*—

a. Sources: In general, any job in which asbestos dust is breathed. For example:

JOB:	WHEN MATERIAL IS:
Handling.	Asbestos
Sawing.	Asbestos mixtures.
Cutting.	
Molding.	
Welding rod salvage.	

b. Job can be done safely with:

1. Segregation of dusty work and,
2. (a) Special ventilation: Hoods enclosing the working process and having linear air velocities at all openings of 100 feet per minute, or

(b) Wearing of special respirators.

3. Periodic medical examination.

13.8 Silicosis.—

a. Sources: In general, any job in which the dust of free silica (sand) is breathed daily. For example:

JOB
Sand-blasting
Sand packing of pipes
Shot blasting of castings

b. Job can be done safely with:

1. Isolation of dusty process and, in addition,
2. Special ventilation: In the case of sand-blasting, the work should be done in the standard type of sand blast room, cabinet, or machine.
3. Special respirator for dust-containing free silica.
4. Periodic examination by doctor.

13.9 Dermatitis.—

a. Sources: Excessive or improper use of cleaning agents such as gasoline. It is not at all uncommon to find dermititis caused by excessive use of common soaps such as those used in laundering. Cutting oils, certain greases, certain insulating materials used on electric cables and conduits can cause dermatitis.

b. Job can be done safely with:

1. Precautions against excessive use of the causative agent.
2. Advice of the medical department in the use of protective salves and creams.

H-14. Ventilation Standards.

14.1 Ventilation is required to control temperature and to remove air impurities, as from welding and paint spraying.

14.2 The maintenance of proper working conditions shall be the responsibility of the safety department, whose staff shall work in close cooperation with the welding, paint, and electrical departments. Air analyses and tests shall be made by the safety and medical consultants of the Navy Department and the Maritime Commission as may be needed.

14.3 Personnel of Department.—

a. Number:

1. The size of the ventilation crew will vary with the type of ship, equipment available, etc. The head of the safety department will be responsible for the organization of the safety department or division.
2. There shall be a ventilation supervisor on each shift responsible to the head of the safety department. Under the supervisor there shall be a sufficient crew to inspect and maintain good working conditions.
3. An EC-2 ship shall have at least one ventilation man aboard. Larger ships, or ships like carriers with considerable galvanized welding, shall have at least two ventilation men.
4. The number of ventilation men on the night shifts shall be in proportion to the construction crews.
5. The ventilation crew must have available a maintenance and repair crew of sufficient size to keep equipment on the job and operating efficiently. Long waits during which equipment is idle must be avoided.

b. Training:

1. The ventilation supervisor (that is, the safety engineer) shall be trained to handle the entire ventilation program in the yard. Local educational institutions, State Industrial Hygiene Units, Maritime Commission engineers, and other sources are available to give this training.
2. The ventilation supervisor shall organize classes, demonstrations, and short talks on standard procedures for ventilating specific spaces on the ships.

14.4 *Type of equipment needed.*—In ship construction, two types of ventilation are used—local exhaust as for removal of welding fumes at the point of origin, and general ventilation to supply fresh air to confined working spaces.

a. Local exhaust:

1. A common length for a local exhaust hose is forty feet. In ordering exhaust fans for use with local exhaust hoses, the following specifications should be met: Capable of drawing a minimum of 200 c. f. m. through each of 3-inch (or 4-inch) diameter flexible hose. Fans should have provisions for attaching three or more local exhaust hoses per unit.
2. In the interests of power economy, it is undesirable to move much more than 200 c. f. m. through each local exhaust hose.

b. General ventilation:

1. It is frequently desirable to introduce air into large working spaces such as deep tanks, fore- or after-peaks. This is done in many yards by using a flexible fabric duct, with metal elbows, and a fan of about 5,000 c. f. m. capacity.
2. It is desirable sometimes to supply a quantity of fresh air into the double bottom. Here a 2,000 c. f. m. unit may be used.
3. These two examples represent the two extremes of this type of work, and therefore are the two extremes in fan sizes. Fan static pressures in each case should exceed four inches of water.
4. For general ventilation of a ship engineroom during construction, a 10,000 c. f. m. blower is recommended. On the other hand, operations in confined quarters where heat is generated (plate shrinking, for example) may use a small portable fan to circulate the air. For this purpose, small blowers of from 800 to 1,500 c. f. m. shall be provided.

c. Ventilating procedures:

1. Local exhaust shall be used whenever a welding operation is being conducted in a confined space, or whenever galvanized metal is being welded. Local exhaust is always a suction process. Never blow a stream of air upon a welding arc.
2. Many welders think that it is enough to hold the end of the suction hose in the same compartment with the welding operation. This is not so. In order to capture the welding fumes, the end of the hose must be within six or eight inches of the arc, assuming a 200 c. f. m. volume per hose. Beyond this distance, the suction hose is ineffective.
3. The air supply to a general ventilation fan must be fresh outside air. Recirculation of air already contaminated shall not be permitted. A minimum of 400 c. f. m. per welder shall be supplied to a given working space such as a deep tank when general ventilation is used alone.

4. In warm weather, air movements or drafts are helpful, while in cold weather a minimum of air movement is desired and local exhaust will serve best. In temperate weather, it is most satisfactory to use a combination of local exhaust and general ventilation.

14.5 *Coordination of department with construction program.*—

a. The ventilation supervisor shall keep abreast of construction, and thus anticipate the ventilation needs.

b. The construction foremen shall inform the ventilation department of ventilation needs before the needs occur.

c. Blackboards, boxes, signal lights, or similar devices shall be installed on board and used to inform the ventilation department of immediate needs.

14.6 *Supplementary ventilating procedures.*—

a. Ventilating confined spaces, such as the fore- or after-peaks and deep tanks, is greatly simplified by the temporary removal or cutting through of certain plates.

b. For example, the fore-peak of a Liberty ship can best be ventilated by cutting a combination access and ventilation hole through the watertight bulkhead near the ship's bottom.

c. The tank top can be left off of the midship deep tanks until all welding has been completed in this space.

d. A side plate can be left or cut out of the engineroom at the bottom deck level.

MINIMUM REQUIREMENTS FOR SAFETY

S-2. Managements Part.

2.1 It is absolutely essential, if a successful accident-prevention program is to be installed and operated, that top plant management take an active and interested part in the work. The same supervision given any other important activity in the shipyard shall be given the safety program.

2.2 The responsibility of management insofar as industrial safety is concerned shall be considered to include—

2.21 The provision of a safe working environment.

2.22 Training of employees for safety.

2.23 Establishment of an accident record and reporting system which will definitely tie into nationally uniform reporting, record, and statistical requirements.

2.24 The appointment, where necessary, of a safety engineer (or a safety director) and staff to install, maintain, and properly supervise an accident-prevention program.

2.25 The issuance of instructions to all division or department heads, foremen, leaders, leadingmen and to any persons in supervisory capacity, that they are considered responsible for preventing accidents which involve employees working under their direction and requiring them to comply with all of the provisions of the accident prevention program in effect in the shipyard.

2.26 An active and interested participation in safety through—

(a) Review of, and executive action on, safety records.

(b) Regular attendance at safety meetings.

(c) Action upon good or bad departmental safety records through personal interviews with department heads.

(d) General letters, for bulletin board posting, addressed to employees and discussions of good or bad yard accident record.

(e) By setting a good example. (Goggles, safety shoes, hard hats and other necessary protective equipment shall be used by any executive who exposes himself to yard operations.)

S-3. Safety Director and Staff.

3.1 A full-time safety director (title may be safety engineer or safety inspector, etc.) and staff shall be appointed for all shipyards. (See Section 3.25 for duties and responsibilities.) The safety director shall report to, and be responsible to, the highest ranking managerial executive or his designated representative.

3.2 The staff in the safety department in addition to the safety director, shall consist of:

3.21 An assistant safety director in yards having 3,000 employees or more except that there shall always be at least one safety engineer per shift.

3.22 One safety engineer (safety inspector) for each additional 1,500 employees. Example: If a yard has 35,000 employees there would be required a safety director and an assistant plus 21 safety inspectors.

3.23 The staff of engineers shall be distributed over the three shifts in proportion to the number of employees on each shift.

3.24 One clerk and/or stenographer for the first 5,000 employees and one clerk for each additional 7,500 employees. (It is not to be assumed that the time of safety inspectors or the safety director can be spent on clerical detail. All office functions, while adequately supervised by the safety

511314—43——3

director, should be carried on by clerks so the greatest possible amount of time of the safety director and his staff may be spent in the shipyard.)

3.25 The duties and responsibilities of the safety director shall include:

(a) Complete responsibility for formulating, administering and making necessary changes in the shipyard accident prevention programs within the limits of authority granted by the shipyard management. The safety director shall also be required to correlate the shipyard accident program with the minimum safety and health standards of the United States Navy Department and Maritime Commission.

(b) Submission of regular monthly, weekly or daily reports on the status of safety directly to the general manager or his designated representative.

(c) Acting in an advisory capacity on *all* matters pertaining to safety to the management, general manager, superintendents, foremen, quartermen, leadermen, purchasing department, engineering department, commissary department, or contractors.

(d) Maintenance of the accident record system, making all necessary reports, personal investigation of all fatal or serious accidents, investigation through his staff of all accidents, securing supervisor's accident reports, checking corrective action taken by supervisors to eliminate accident causes.

(e) Supervising, or closely cooperating with the training supervisor in the safety training of all employees. (See Section 6.26.)

(f) Correlating safety work with medical department to insure proper selection and placement of employees.

(g) Making personal inspections and supervising inspections by staff and by special employee committees, for the purpose of *discovering and correcting unsafe conditions or unsafe work practices BEFORE THEY CAUSE ACCIDENTS.*

(h) Exchanging information with other shipyards on best safety methods and consulting with United States Navy Department and Maritime Commission Regional Safety Consultants on safety problems which cannot be solved with methods or information at hand.

(i) Making certain that all federal, state or local laws, ordinances or orders bearing on industrial safety are complied with.

(j) Securing any necessary help or advice from the state labor departments on matters pertaining to safety and health.

(k) Initiating activities that will stimulate and maintain the interest of employees in safety.

(l) Acting as secretary of all safety committees and in such capacity he shall prepare an agenda for each such meeting covering the business to be discussed and, he shall prepare for the record, minutes of each such meeting.

(m) Directing the activities of his staff including the assistant safety director, so that the shipyard accident prevention program will be efficiently operated. It is expected that the safety director may delegate certain responsibilities to his staff engineers, such as that of acting as secretary of certain of the safety committees. Permission for such delegation of authority is expressly given in the interest of efficiency and for training the safety staff.

(n) Submission of the required reports on the status of safety in the shipyard to the interested government agencies at the time and intervals hereinafter requested.

S-4. Accident Prevention Forms and Reports.

4.1 The safety director shall cause to be designed and put into use at least the following forms and records:

4.11 *Supervisor's report of accident.*—

(a) Giving all vital data on case plus statements as to unsafe act and/or unsafe condition, reason unsafe act or condition was permitted to exist or occur, and the immediate corrective action taken or recommended. (See Form 1.)

4.12 *Safety engineer's recommendation form.*—

(a) Form used by safety staff to record recommendations made during inspection. Used for follow-up. Made in triplicate; one to leader-

U. S. MARITIME COMMISSION — U. S. NAVY
PRIVATE SHIPYARDS
SUPERVISOR'S REPORT OF ACCIDENT OR OCCUPATIONAL DISEASE

Budget Bureau No. 62-R065-42
Approval expires January 31, 1944

Fill out for every disabling injury (or case of occupational disease) whether or not compensable. Answer every question fully. Use other side if necessary. To be mailed with the Monthly Injury Summary (for the month covered in that report) by the 15th of the following month to the Division of Industrial Injury Statistics, Bureau of Labor Statistics, Washington, D. C.

(1) Name of yard..... (City) (State)

(2) Name of injured employee..... Badge No.....

(3) Occupation ..... Department .....

(4) Date of accident..... Hour of day..... a.m. p.m.

(5) Witnesses: Name..... Badge No.....
" ..... " " .....

(6) Describe accident or case fully (what injured was doing, what happened, etc.).....

(7) What unsafe condition caused accident or occupational disease? (Specify: broken ladder, defective staging, lack of ventilating equipment, etc.)

(8) What was done wrong (unsafely) that caused accident or occupational disease? (Specify: failure to wear provided goggles, overloading crane, using mushroomed chisel, failure to use respiratory protective equipment, etc.)

(9) Describe resulting injury or occupational disease. (Specify: lacerated hand, broken left leg, right thumb amputated, lead poisoning, etc.)

(10) What have you done to prevent similar occurrences? .....

(11) What do you recommend to prevent similar occurrences? .....

(12) Signed by:..... Title:..... Date:.....

Checked by:.....

DO NOT USE

Serial No.....
Code date.....
Region.....
Location.....
Occupation.....
Dept.....
Injury date.....
Time of day.....
Agency.....
Agency part.....
Uns. mech. cond.....
.....
Acc. type.....
Uns. act.....
Uns. pers. fact.....
.....
Injury.....
Body part.....

FORM 1. (See paragraph S. 4.11–a.)

16

17

SAFETY ENGINEERS RECOMMENDATION FORM

BLANK SHIPBUILDING COMPANY

To:_____ Location _____

Date_____ Time_____

An inspection of operations under your supervision revealed the following unsafe practices and/or conditions:

NOTE: (Unsafe acts or conditions to be described here and numbered. Badge numbers or names of men involved may be listed.)

Above conditions or practices last observed (1)_____ (2)_____ (3)_____

Corrected at once?_____ If not, when will corrective action be taken?_____

Signed_____
Safety Department

Date checked_____ Signed_____
(Used only if condition is not corrected at once.) Safety Department

No. 000

NOTES: (1) Size, approximately 3" x 5"
(2) To be made out in triplicate (See 4.12)
(3) Form need not be filled out if condition is corrected at once unless unsafe act or condition is a repetition or a flagrant violation of safety rules is involved.
(4) If check shows existence of same unsafe act or condition the matter should be referred in writing, to the proper executive for action.

FORM 2. (See paragraph S. 4.12–a.)

man or quarterman on job, one to general manager, or other designated executive, one to safety department files after use to check performance. (See Form 2.)

4.13 *United States Navy Department and Maritime Commission monthly injury summary.*—

(a) To be submitted monthly to United States Navy-Maritime Commission. (See Form 3 attached.) To include over-all breakdown of predominant accidents, types and causes, accident frequency, total number of fatal cases, total of lost-time cases and the time lost, etc. *This form to be used also for report to management of shipyard.* To be submitted in triplicate as required on form. (See Form 3.)

(b) The following formula shall be used in determining accident frequency rates for shipyards:

1. Accident Frequency =

$$\frac{\text{Number Disabling Injuries} \times 1{,}000{,}000}{\text{Total Man-Hours Worked for Period Covered}}$$

2. A disabling injury shall be considered to be any injury which results in a man being unable to report for work on the next regular day or shift after the accident, or one which calls for a standard time charge being made regardless of whether time is actually lost. If time is lost due to the injury, subsequent to the initial return to work, then the injury shall be accounted as disabling.

4.14 *Minutes of safety committee meetings.*—

(a) Minutes of meetings should show date and time of meeting, names of those present, action on unfinished business, brief description of new business discussed and action taken or ordered by the committee on each item. The discussion should always include the predominating accident hazards of the yard and the means suggested to control them.

(b) Various committee forms will be made available to shipyards on request.

4.17 These forms and any others pertaining to industrial safety or health shall be filed and made available to authorized

Budget Bureau No. 43-R666.42
Approval expires January 31, 1944

U. S. MARITIME COMMISSION — U. S. NAVY
PRIVATE SHIPYARDS

INJURY SUMMARY FOR MONTH OF_____, 19____

Three copies to be submitted by the 15th of the succeeding month; one copy, together with the Supervisor's Report of Accidents for each injury reported during the month, to the Division of Industrial Injury Statistics, U. S. Bureau of Labor Statistics, Washington, D. C.; one copy to the Chief Safety Consultant, U. S. Maritime Commission, Washington, D. C.; and one copy to the Regional Safety Consultant, U. S. Maritime Commission, in the region in which the shipyard is located.

1. Name of company.....

2. Location of shipyards..... (City) (State)

EXPOSURE DATA

3. Average number of employees..... (Includes clerical employees and executives.) 4. Total employee-hours worked during month.....

INJURY DATA Disabling injuries	Number		Days Lost	
	Occurred during month (a)	Of greater severity than formerly reported (b)	For injuries during month (c)	For injuries formerly reported (d)
5. Fatalities				X X X
6. Permanent impairments				
7. Temporary total				
8. TOTAL		X X X		
9. Non-disabling injuries		X X X	X X X	X X X

10. Frequency rate..... Total number of disabling injuries (item 8) x 1,000,000 / Total employee-hours worked (item 4)

11. Yearly frequency rate to date.....

Comments: .....

Report made out by:..... Title:..... Date:.....

INSTRUCTIONS

1. A disabling injury is one which results in death, permanent impairment (through amputation or loss of use of any body part), or time loss beyond the day or shift on which the injury occurred.

2. Show in column (a) [of Injury Data] the total number of injuries which occurred during the month, and in column (b) the number of injuries which were determined to be more severe than formerly reported. For instance, show as a fatality an injury formerly reported as a permanent impairment if the injury resulted in death during the month covered by this report, and explain briefly under "Comments."

3. In column (c) show the actual days lost during the month because of injuries which occurred during the current month. In column (d) show the number of days lost during the current month because of injuries which were reported in previous month. Do not use A.S.A. time charges for deaths or permanent impairments. For fatalities show the number of days intervening between the day of injury and death (i.e., if death occurs on the day of injury show no time lost). For permanent impairments show the number of days during which the injured person was unable to work.

(Over)

FORM 3–Front. (See paragraph S. 4.13–a.)

ACCIDENT CAUSE ANALYSIS FOR THE MONTH

Unsafe condition or practice (If more than one item applies, give preference to the one appearing first on the list)	Disabling injuries		
	Total		Resulting in infection during the month
	This month	Year to date	
a. Lack of goggles or screens — eye injuries only			
1. No impact goggles			
2. No anti-flash goggles under hood			
3. No welding screens			
4. No welder's hood			
5. Other (specify)			
b. Improper method of handling material			
1. Lifting with bent back, poor grip, etc.			
2. Insufficient help in lifting			
3. Failure to use crane, hoist, etc.			
4. Failure to wear safety shoes			
5. Failure to wear gloves			
6. Other (describe)			
c. Poor housekeeping resulting in falls			
1. Unguarded hatches, holes, pits, etc.			
2. Defective ladders, staging, etc.			
3. Unsafe use of ladders, staging			
4. Poor housekeeping generally			
5. Other (specify)			
d. Poor housekeeping — all other injuries			
1. Poor layout			
2. Poor housekeeping generally			
3. Other (specify)			
e. Improper condition or use of hand tools			
1. Unsafe condition of hammers			
2. Unsafe use of hammers			
3. Defective chisels — hand and air			
4. Unsafe use of chisels — hand and air			
5. Other (specify)			
f. Improper condition or use of welding and cutting tools (except eye injuries)			
1. Lack of ventilating equipment			
2. Improper use of ventilating equipment			
3. Defective cables of electric welding equipment			
4. Defective electric welding equipment			
5. Improper use of electric welding equipment			
6. Defective gas welding or cutting equipment			
7. Improper use of gas welding or cutting equipment			
8. Other (specify)			
g. Improper placing or piling causing falling objects			
1. Placing insecurely on staging			
2. Placing insecurely on stockpiles			
3. Other (specify)			
h. Defective or unsafe use of machinery			
1. Unguarded power presses			
2. Unguarded or defective abrasive wheels			
3. No goggles or shield when using abrasive wheels			
4. Failure to adjust rest — abrasive wheels			
5. Defective or unguarded shears, rolls, brakes			
6. Other (specify, as overhead cranes, etc.)			
i. Defective or unsafe use of cranes and hoisting equipment			
1. Defective slings			
2. Defective pads, rings, clamps			
3. Unsafe hooking or rigging of load			
4. Standing under or near suspended load			
5. Other (specify)			
j. Improper protection against spray painting			
k. Improper protection against sand blasting			
l. All others			

representatives of the United States Navy-Maritime Commission upon request.

S–5. Safety Committees.

5.1 The safety director, in cooperation with the shipyard general manager, shall cause to be formed and put into effective operation at least the following safety committees.

5.11 *Central safety committee.*—

(a) Membership: management representative (chairman), safety director (secretary), all superintendents, foremen, medical department representative, quartermen or leadermen, and one employee.

(b) Membership of all but management representative, medical department representative and safety director may be rotated—terms of 2 months each but rotation to be arranged so only ½ of committee changes each month.

(c) Meetings: Shall be monthly or more often as necessary.

(d) Duties: This is the policy forming committee for safety work. They review the monthly report as submitted to the United States Navy-Maritime Commission and other records to determine the course of safety work for coming period. They decide such matters as type of safety equipment to be used and how it shall be made available to men, types of safety training to be used, whether accident prevention plan is being adherred to, interplant contest awards, etc. Such committees shall review the investigation on fatal or serious accidents and make recommendations. All Committee members are expected to make practical suggestions to improve shipyard safety. They also review reports of other committees to make certain suggestions and recommendations are properly followed through.

(e) Secretary: The safety director shall act as secretary, prepare an agenda, take minutes, prepare a report of committee meeting, and distribute copies of reports to members. He shall follow through with other committees, the suggestions and recommendations of the central safety committee.

5.12 *Supervisors' safety committee.*—

(a) Membership: Management representative, safety director, medical department representative, superintendents, foremen, quartermen, and leadermen. This is a rotating committee; rotation should be arranged so all of the supervisory staff serve in their respective periods, i. e., superintendents change each four months, foremen each two months, quartermen and leadermen each month. In no case should an entire group change at one time. Where a department or unit of a department has an unusually poor record then the responsible supervisory staff—superintendent, foremen, quartermen or leadermen should be retained on the committee until their record is at least equal to the shipyard average.

(b) Meetings: Shall be monthly or semimonthly or more frequently, as necessary.

(c) Duties: The primary purpose of this committee is the stimulation and maintenance of interest and the education of its members in accident prevention. The shipyard accident record shall be reviewed, the predominant types of accidents and the predominant causes of these accidents shall be discussed. Suggestions and recommendations to improve the records are solicited from each member. At least one timely subject must be discussed at each meeting; i. e., such as eye injuries and their prevention, electric shocks, hand tool accidents, etc. Methods of avoiding accidents due to these operations should be presented by the committee members.

(d) The committee shall review reports of all fatal and serious accidents and suggest preventive action. It shall review reports of inspection committees and check on the quality of the suggested corrective action for unsafe conditions or practices reported.

(e) The committee shall carry out the suggestions and recommendations of the central committee.

(f) Outside speakers such as safety engineers, insurance men, State Department of Labor men or men from other shipyards, may be used from time to time to stimulate interest of committee members in accident-prevention work. Sound film strips, motion pictures or other similar media on safety subjects can and should be used if available and practicable.

(g) Secretary: Same as for central safety committee.

5.13 *Regular inspection committees.*—

(a) Number: One committee for each department and each hull.

(b) Inspection: Weekly or more often as necessary.

(c) Membership: At least two employees and a supervisory employee of each job being inspected. The safety director or staff safety engineer should accompany the committee.

(d) Duties: To inspect their department or hull for the purpose of discovering and having corrected unsafe acts and unsafe conditions likely to cause accidents. On each section of a job they should be accompanied by a responsible supervisory employee. They are observers only—the foremen, quartermen or leadermen shall do all corrective work. Where a condition is discovered on which there is disagreement the superintendent shall make the necessary decision. *Hazards immediately dangerous to health, life or limb shall be corrected by the accompanying supervisor at once.*

(e) The committee shall submit written reports to the safety director and indicate whether accident-producing conditions or practices have been corrected. These reports shall be referred to the supervisory safety committee by the safety director. If necessary because of dangerous conditions, he may refer them at once to the general manager.

5.14 *Special inspection committees.*—

(a) Staging inspectors, electrical inspectors, crane inspectors, boiler inspectors, and others.

(b) Membership: Specially qualified individuals or teams permanently assigned to work. (See paragraph 5.15c.)

(c) Duties:

1. Staging inspectors: Daily or continuous inspections of all stages shall be made on each

hull—or other locations where stages are used. Report shall be made of all defects to the responsible supervisor for immediate correction. Copy of the daily report shall be submitted to the safety director.

2. Crane inspectors: Weekly inspections shall be made of all cranes and rigging. Reports shall be submitted to proper department heads for correction of unsafe conditions or practices. Copies of reports on defects shall be made to the safety director.

3. Other inspectors: As above and at indicated frequency.

5.15 *Safety committees—General.*—

(a) Committees in addition to those specified in these standards, may be formed and operated if desired.

(b) Representatives on all committees, when of a supervisory status, should be appointed by the shipyard general manager and held responsible by him for active and interested participation in the work of the committee. Employee representation may be secured in the same manner, or by appointment of employee committees, union shop stewards or by election of union members or by any other feasible means.

(c) The services of production employees having related duties may be taken advantage of on inspection committees. Stage erectors or repair men may serve as permanent and continuous staging inspectors, a man or men from the ventilation crew may be utilized for checking on ventilation practices. The reports of state or insurance inspectors will be considered adequate on boilers, air compressors and receivers or on other pressure vessels.

S-6. Employee Safety Training.

6.1 The time for the safety training of an employee to start is at the inception of his employment. After a physical examination, which should be made to make certain that the employee is physically capable of performing safely the work he is requesting, the man shall have explained to him the safety policy of the company by a representative of the safety department. This may be done individually, in general groups or in craft groups and the instruction may

be supplemented by printed instructions in the form of rule books or instruction cards.

6.2 Employees shall have in their possession, and be instructed in the proper use of, all necessary personal protective equipment before being started on any job.

6.3 General safety rule books, craft safety rule books or safety instruction cards should be supplied employees. Such books should be concise but complete enough to furnish written record of all important safety rules. *No rule shall be included which will not be strictly enforced.* The assistance of United States Navy-Maritime Commission safety engineers will be given in the preparation of such rule books if desired.

6.4 All employees shall be instructed in their specific duties by their immediate supervisor and they shall be made familiar with the hazards of the job and instructed carefully in how to avoid them. It shall further be the duty of the supervisor to constantly check all employees so unsafe working practices may be corrected before accidents occur.

6.5 Safety instruction shall be correlated with all apprentice and craft training schools. Safety instruction in such schools or training courses shall include an explanation and demonstration of the need for the safety equipment or safe practices specified and the strict enforcement of all safety requirements in the classes. The instructors shall, by their own example, impress upon the learners the importance of the safety requirements.

6.6 Safety bulletin boards shall be located at each hull and shop, and at such other locations where they may be desirable, on which safety posters, letters or bulletins from the shipyard management or safety department and other safety material may be posted.

6.61 The bulletin boards shall be located where the majority of the employees at a particular location will see them.

6.62 The bulletin boards shall be well constructed, have a locked glass cover and shall be lighted at night.

6.63 Safety posters and other material on bulletin boards shall be changed at least semimonthly or more often. (Posters will be made available by the United States Navy-Maritime Commission for the use of shipyards. However, posters may be selected by the shipyard safety department from any source.)

6.7 Where shipyard house organs (magazines or newspapers) are established, the safety director shall arrange to have a reasonable proportion of the space devoted to safety (articles, items and cartoon cuts relating to safety will be made available by United States Navy-Maritime Commission safety consultants.)

6.8 Sound-film strips and motion pictures on safety subjects should be used where practicable. Public address systems, where installed, may be used for safety messages to shipyard employees especially during lunch hours or at shift changes.

S–7. Safety Supply Store.

7.1 A safety supply store shall be established in each shipyard where safety shoes, safety hats, protective impact goggles and filter-lens welding goggles shall be made available to shipyard workers. Shoes may be sold at or near cost to employees, but safety hats and impact and filter-lens goggles shall be issued to each employee but shall remain the property of the company to be returned when the employee ends his employment. Equipment such as work clothes, gloves, welders helmets, may also be stocked and sold to employees if desired.

7.11 Goggles may be stocked in the central tool room or first-aid department but should be fitted as described in paragraph 7.2 following.

7.2 The attendant of the safety store should be skilled in fitting safety shoes, and if goggles are also issued, he should be trained in proper fitting and servicing of goggles.

S–8. Goggles.

8.1 Impact-resisting goggles of a type suitable for the particular job and also of a type meeting the requirements of the United States Bureau of Standards, shall be worn by every employee exposed to the hazard of eye injuries. Practically every employee in the shipyard, with the exception of those working inside offices at all times are either directly exposed to eye injury from the work they do, or indirectly through working near operations which are likely to produce flying objects. (See paragraph H–10.3a, page 4.)

8.2 Except where *temporary* lack of goggles make it impossible, each employee shall have his own pair of goggles. If it is necessary to reissue goggles to different employees, *the goggles must be sterilized after each use.*

8.3 Goggles supplied employees should be carefully fitted to their face to prevent irritation and to prevent the entrance of foreign objects around the edges. (See paragraph 7.2.)

8.4 All employees working in proximity to arc-welding operations shall be required to wear anti "flash" goggles, of at least No. 2–5 shade (or equivalent), of a type meeting the requirements of the United States Bureau of Standards. (See section 9.1 on welding for additional eye protection for welders.)

8.5 Welding screens constructed of wood, metal or other suitable material shall be used to protect the eyes of workers in proximity to electrical welding operations, whenever their use is practicable.

S–9. Welding—Arc.

9.1 All welders shall be made familiar with the hazards of their work and instructed in safe methods of performing the various types of jobs to which they are assigned.

9.2 Personal protection equipment used by welders shall include:

9.21 Welders' protective hood provided with the proper shade of filter type lens for protection against the harmful rays of the arc and a clear cover glass to protect the filter lens.

(a) The shades or their equivalent recommended are:

Up to 30 amperes—No. 6–7 Shade.
30 to 75 amperes—No. 8 Shade.
75 to 200 amperes—No. 10 Shade.
200 to 400 amperes—No. 12 Shade.
Over 400 amperes—No. 14 Shade.

(b) Shades may also be selected from the following table:

Rod diameter	*Welding glass shade No.*
1/16	10
3/32	10
1/8	10
5/32	10
3/16	12
7/32	12
1/4	12
5/16	14
3/8	14

(c) The welder's hood should be inspected at least weekly to detect possible light leaks, cracked protective glass, or badly fouled or missing cover glasses. Any defects discovered shall be corrected at once.

9.22 Protective leather welders' jacket, long-sleeved wool shirt with buttoned collar and leather welders' glooves and safety hat.

(a) It has been found satisfactory in the hot summer months to substitute flameproofed cotton shirts. If this is done, the flameproofing, which must must be reapplied after each washing, should be done under the direction of the shipyard. This entails that laundering also be done by the company. Commercial laundries are rapidly undertaking this type of work.

9.23 Hardened and filter lens protective goggles with sideshields to be worn under the hood for protection against harm-

ful rays where the hood is raised and for protection against flying scale and chips. The goggles should be of a type meeting the requirements of the United States Bureau of Standards and of at least No. 2–4 shade or equivalent.

9.24 Safety shoes or pull-on boots with cord or leather soles and heels.

9.3 Welding screens (constructed of flameproofed fabric on wood or metal frames, metal on metal frames, or plywood sheets joined by rings) of a size sufficient to protect men working nearby from the harmful effects of the electric arc rays shall be used on all electric welding operations when practicable.

9.31 A type found very successful by one large company can be economically constructed of ¼″ to ⅞″ plywood. Two pieces about 18″ x 30″ are joined at two points along one edge with 2″ x ⅛″ rings. The large size of the rings allows the two pieces to lap sufficiently to make a lightproof joint, while the light weight of the assembled screen makes men more prone to use them.

9.4 Welding leads shall be inspected at least once each shift, and those found defective shall be repaired or replaced.

9.5 All welding leads should be coiled back to centrally located stations after the completion of each shift or job.

9.6 Welding rod tips should not be thrown on decks or stages but should be retained by the welder and turned in at the end of the day for salvage.

9.7 Each electric welder shall make an inspection of the area below him, and of the opposite sides of bulkheads on which he is working, to make certain that there is no danger of falling or penetrating sparks causing a fire. He and his helper must know the location of fire extinguishing equipment and how to use it. It is recommended that a fire extinguisher be available in the immediate area.

9.8 The safety of women welders presents several special problems which should be carefully considered while women are being trained and during their first several weeks on the job.

9.81 Women will at first be subject to excessive fatigue because they are unaccustomed to shipyard work. In their enthusiasm they are likely to overdo and will, under such conditions, be more prone to accidents and at the least, absences may follow. They should, until they become accustomed to the work, be carefully watched by supervisors and if signs of fatigue are evident they should temporarily be given lighter work.

9.82 Work clothing for women is still in the development stage. In general, however, the following should be observed:

(a) Safety shoes or pull-on boots with cord or leather soles and heels.

(b) Long underwear, union suit type (wool for winter) khaki trousers and shirt, or coverall type of overall with a drop seat and welders' leather uniform.

(c) It is desirable that the outer clothing, unless of wool, be flameproofed.

(d) Leather gloves.

9.83 Whenever possible, mechanical means of handling material should be utilized in preference to manual handling.

S–10. Burners.

10.1 Equipment for burners shall be the same as that for welders except that the leather clothing and welders' helmets need not be worn. Filter type lens protective glasses with side shields. No. 3–8 shades or their equivalent should be worn. Flameproofed clothing is desirable.

10.2 All individual oxygen and acetylene and other gas lines shall be turned off at the manifold at lunch hour and at quitting time or if the burner must leave the immediate vicinity of his work during the regular shift.

10.3 All hose should be coiled up to the manifold when shifts are changed or when jobs are completed.

10.4 The practice of dusting the clothes by blowing oxygen on them or using oxygen for ventilating or cooling purposes has resulted in several fatalities and *shall be absolutely forbidden.* Oxygen shall be used only in connection with burning or welding operations.

10.5 Each burner shall make an inspection of the area below him, and of the opposite sides of bulkheads on which he is working, to make certain that there is no danger of falling sparks causing a fire. He and his helper should know the location of fire-extinguishing equipment and how to use it. It is recommended that a fire extinguisher be available in the immediate area.

10.6 Burners' uniforms (overalls) shall be laundered at least weekly except that if oil or grease is spilled on the clothing, it shall be changed at once. It is desirable that arrangements be made by the company to have uniforms (overalls) laundered and flameproofed.

10.7 Defective burning equipment such as torch, hose or cylinder pressure regulators (where cylinders are used), shall be repaired immediately.

10.8 All oxygen and acetylene (gas) lines shall be inspected at least once each shift and those found defective shall be repaired or replaced.

10.9 Standard color coding for oxygen and acetylene pipe lines shall be observed for oxygen and acetylene. (Since it may be impos-

sible to secure colored hose during the war, identification may be made by any practicable means so long as every burner and burner's helper or any other person who has occasion to use oxygen-acetylene (gas) equipment is thoroughly familiar with it.)

S–11. Cranes (Whirleys, Hammerheads, Bridge, etc.)

11.1 The safe loads as specified for cranes on single lift shall not be exceeded.

a. For the guidance of crane operators, weights of all sections over 5 tons shall be plainly marked on the section in figures at least 12 inches high.

11.2 On double lifts, cranes shall not be loaded to more than 75% of their combined rated capacities.

11.3 All crane operators shall be given a thorough physical examination upon employment and at at least yearly intervals thereafter. Particular attention should be given to the eye examination.

11.4. Crane inspectors. (See section S. 5.14.)

11.5 All whirley and hammerhead cranes shall be provided with bumper guards of ¾″ wire rope or equivalent set from 32 to 36 inches from the ground, and fastened in the form of a half loop to all four wheel covers at the leading and trailing ends of the crane.

11.6 All traveling cranes regardless of the type shall be equipped with a clearly audible automatically operated signal which will indicate that the crane is in motion. A siren or electric horn pitched to a tone above or below the general noise level of operations is preferable to a gong or bell.

11.7 The crane operator shall take signals only from the designated hook tenders or riggers and no others. Hook tenders shall be identified by special hats or arm bands.

11.8 All loads shall be lifted or lowered under power.

11.9 Employees shall not be permitted to pass between the leading and trailing trucks of whirley cranes AT ANY TIME.

a. Wheel covers shall be provided which will protect all wheels of whirley, gantry, hammerhead and bridge cranes to a distance of ½ inch from the crane tracks.

11.10 Employees shall not remain under, or pass under crane loads.

11.11 Trolley lines for cranes shall be protected against accidental contact by men or material, by wood or other suitable sheathing, or if the trolley lines are elevated they shall have a vertical clearance of at least 12 feet above the ground.

a. Bumper guards for trolley ends of bridge cranes should be provided to prevent the hoisting cables from swinging into the trolley wires.

11.12 The crane operator shall be required to immediately notify a designated department head of any defects he notices in the crane or its equipment.

11.13 No person other than the crane operator, a trainee, the supervisor in charge of cranes, the crane inspector, repairmen on crane repair jobs or safety department men shall be permitted in crane cabs. No more than three persons shall be in the cab at any time.

a. Whenever possible, crane operators should be relieved on the ground and not in the crane cab.

11.14 Except under emergency conditions and then only with the approval of the safety department, men shall not ride loads. Men shall never be permitted to ride empty hooks or slings.

11.15 A clearance of at least 2 feet and preferably more shall be maintained between the crane and any stationary object or materials. Where existing structures make this clearance impossible, an exception to this rule may be granted by the United States Navy-Maritime Commission Safety Consultant after an inspection.

11.16 Strong-backs or spreaders should be used on all lifts where there is danger of the load buckling or where the spread is so wide slings or clamps may slip. Steel strong-backs are preferable to wood.

11.17 The hook tenders shall familiarize themselves with the weights of the various plates, shapes and sections handled, so chain or cable slings of the proper size will be used on lifts.

11.18 All chain and cable slings and strongbacks should be clearly marked, by color coding, to indicate the maximum safe load for which they are to be used.

11.19 All electric cranes should be equipped with limit switches to prevent double blocking.

11.20 Storage racks shall be provided for all chain and cable slings at points convenient to the operations so they may be safely stored when not in use. All chain and cable slings shall be inspected before each use by the hook tender and if found defective, shall be sent to the proper department for repair. Such inspections shall be in addition to, not substitutes for, the regular inspections by the safety department.

S–12. Plant Housekeeping.

12.1 Housekeeping shall be maintained at a high standard in all parts of the shipyard at all times. The following rules shall (or should, as indicated) be put into effect:

a. Wide, well-defined roads, aisles, and passages shall be laid out in the yard and shops and they shall be kept clear of obstructions and shall be kept clean and free from debris. The width of aisles and passages in some of the older yards may be limited because of exist-

ing structures, but an effort should be made to maintain a width of twice that of the widest hand or power truck, plus two feet.

12.12 Aisles and passages should be defined by white or yellow lines painted on the floors. Materials or machines should not be permitted to encroach on these lines into the aisle.

12.13 All staging platforms, ramps, stairways, walkways, or other walkway surfaces on shipways shall be kept clean of all debris such as welding rod tips, bolts, nuts, and similar material. Welding leads, burner hose and air hose should be elevated over or placed under the walkway surfaces or protected by cross-over planks. They should be neatly arranged and not left in coils or loops where they may cause men to trip and fall.

12.14 All deck areas on hulls shall be kept free of debris and construction material shall be neatly piled so as not to present a hazard to employees. (See par. S. 12.13 on hose, etc.)

12.15 All deck openings shall, as soon as practicable, be protected with guardrails at least 42 inches in height set 12″ back from the edge of the opening. Manholes may be guarded by tacking three uprights to the deck and then tacking a ring of the proper diameter to the top of the uprights. Hatches, without coamings, may be guarded by tacking uprights to the deck at intervals of not more than 10 feet and fastening 2″ x 6″ or 2″ x 8″ timber rails in place at 42″ from the deck. Midrails set 21″ from the deck may be used also, and are especially recommended where women are employed.

(a) Where they are projecting stud bolts around the manholes or tank tops, they should be protected with either metal strips or wood covering to prevent slips and falls or snagging of clothing of workers.

12.16 All snow and ice shall be cleaned from stagings and platforms (by turning the planks), and from decks, before men on regular production are permitted to work on them.

12.17 Free access shall be maintained at all times to all exists and to all fire-alarm boxes or fire-extinguishing equipment.

12.18 All oils, paints, thinners, solvents, waste, rags, or other flammable substances shall be stored and used strictly

in accordance with the requirements of the National Fire Protection Association standards.

12.19 All staging lumber, or other lumber, when dismantled shall have all nails or spikes removed or bent over.

12.20 Plates and shapes shall be stored either in substantial metal or heavy timber racks or stored flat on a substantial timber or concrete foundation that will prevent shifting.

(a) Plates and shapes shall be stored so there is at least an 8-foot clearance from the center line of railroad tracks.

12.21 Angle brackets and similar small pieces shall be stored in racks.

S–13. Lighting.

13.1 A level of illumination should be maintained for the various type of jobs in all shops, at least as high as that recommended by the standards of the Illuminating Engineering Society.

Minimum Standards of illumination for certain industrial interiors as recommended by the Illuminating Engineering Society are as follows:

Type of Work	*Minimum operating foot-candles—measured on the work*
Assembly:	
Rough	10
Medium	20
Construction—Indoor:	
General	10
Forge shops and welding	10
Foundries:	
Charging floor, tumbling, cleaning, pouring and shaking out	5
Rough molding and core making	10
Fine molding and core making	20
Machine shops:	
Rough bench and machine work	10
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	20
Paint shops:	
Dipping, simple spraying, firing	10
Rubbing, ordinary hand painting and finishing; art, stencil and special spraying	20
Power plants, engine rooms, boilers:	
Boilers, coal and ash handling, storage battery rooms	5
Auxiliary equipment, oil switches and transformers	10
Engines, generators, blowers, compressors	15
Receiving and shipping	10
Sheet metal works:	
Miscellaneous machines, ordinary bench work	15
Punches, presses, shears, stamps, welders, spinning, medium bench work	20

Type of work	Minimum operating foot-candles—measured on the work
Steel and iron manufacturing:	
Billet, blooming, sheet bar, skelp and slabbing mills	5
Boiler room, powerhouse, foundry and furnace rooms	5
Cold strip, pipe, rail, rod, tube, universal plate and wire drawing	10
Repair shops:	
Rough bench and machine work	10
Medium bench and machine work	20
Blacksmith shop	10
Carpenter and pattern shop	20
Storage	2
Store and stock rooms:	
Rough bulky material	5
Medium or fine material requiring care	10
Structural steel fabrication	10
Woodworking:	
Rough sawing and bench work	10
Sizing, planing, rough sanding, medium machine and bench work, gluing, veneering, cooperage	20

13.2 All lights should be provided with reflectors suitable for the type of work being done and meeting the requirements of wartime dim-out regulations. A regular schedule of cleaning and maintenance should be instituted that will keep the lighting units at their original efficiency.

S-14. Hand Tools.

14.1 All tool rooms issuing hand tools such as hammers, sledges, chisels, spud wrenches, center punches, portable air-driven tools, portable electric tools and other tools should be inspected daily by a safety engineer to make certain that only tools in good condition are being issued. Tools in poor condition shall not be issued.

14.2 Workers' personal tool kits should be inspected at monthly intervals so defective tools may be discovered and repaired.

S-15. Handling Material (Manual).

15.1 All employees should be instructed in the proper method of lifting. No limit can be set as to the maximum weight to be lifted by one man, but it should be made clear to all employees that they should secure help if the load is too heavy or too bulky for one man to handle easily. Mechanical equipment should always be used when it is available and its use is practicable.

15.11 Posters illustrating the proper method of lifting should be displayed frequently and men observed lifting incorrectly should be reinstructed by their supervisor.

S-16. Machine Guarding.

16.1 All belts, pulleys, gears, chains, sprockets or other dangerous moving parts of machines shall be completely enclosed with guards

constructed of angle-iron brackets covered with heavy sheet metal or ½-inch wire mesh. Vertical or inclined belts shall be guarded to a height of 6 feet above the floor. Horizontal belts over 8 feet above the floor may be guarded only on the under side. Gears, chains and sprockets should be guarded no matter where located.

16.11 Since metal may not be available for guards at present, substantially constructed wood guards will be acceptable.

16.12 In all cases where state requirements are more stringent than those given above, the state rulings must be followed.

16.2 All machines shall be guarded at the point of operation so employees will not be injured while operating the machine.

16.21 The standards of guarding for the various machines as recommended by the Insurance Rating Bureau should be followed except where state requirements are more stringent when the latter will take precedence.

S-17. Staging and Ladders.

17.1 United States Navy—Maritime Standards of Construction for shipyard staging is in the process of development and will replace the present recommended practice when published.

17.2 All staging, scaffolding, platforms and walkways shall be constructed in accordance with the requirements of the California State Industrial Commission except where existing state codes are more stringent in which case the latter shall take precedence.

17.3 All ladders should conform to the American Standard Safety Code on ladders.

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